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Machine learning methods for mass and lifetime measurements of unstable isotopic and isomeric states in storage rings

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Non-destructive Schottky detectors can be used to accurately determine the masses and lifetimes of exotic nuclear species and/or their isomeric states in storage rings. The analysis requires time-resolved spectra to undergo particle identification and determination of frequency spread Δf and decay time. Often times corrections for rigidity, drift, etc. need to be applied, or spectra need to be generated with different conditions. As detector efficiency increases, and with it the amount of data, manual analysis becomes increasingly error-prone and time-consuming. DNNs can be used to analyze 1D and 2D spectra. In the future, data from several detectors can be combined.

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